REMARKS

Applicants request favorable consideration and allowance of the subject application in view of the preceding amendment and the following remarks.

Claims 1-3, 5, 10-13, 37-46, 54, and 56-64 are now presented for examination. Claims 1, 2, 10, 12 and 37 are independent. Claims 7-9 have been canceled without prejudice or disclaimer. Claims 1, 2, 10, 54 and 56-59 have been amended to clarify features of the subject invention, while claims 60-64 have been added to recite additional features of the subject invention. Support for these changes and claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants note with appreciation that claims 12, 37-46, 58 and 59 have been indicated as being allowable. New claims 63 and 64, depending from independent claims 12 and 37, respectively, also should be deemed allowable at the outset. Applicants further note with appreciation that claims 7-9 have been indicated as containing allowable subject matter. Applicants earnestly believe, however, that they should be entitled to the protection afforded by independent claim 1, as presented. In addition to these claims being allowable, Applicants submit that independent claims 1, 2 and 10, for example, patentably define features of the subject invention.

Applicants request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Claims 1, 3, 5, 7-9, 11, 13 and 54 were rejected under 35 U.S.C. § 112, first paragraph. The Examiner asserted that the subject disclosure did not adequately describe the features previously recited in independent claim 1. This rejection is respectfully traversed. Nevertheless, to expedite prosecution, Applicants have amended independent claim 1 to

clarify features of the subject invention. Applicants submit that these changes overcome the rejection under 35 U.S.C. § 112, first paragraph. Such favorable indication is requested.

Claims 1-3, 7-11, 13, 54, 56 and 57 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner objected to specific recitations in several of these claims. To expedite prosecution, Applicants have amended the pending claims in light of the Examiner's comments. Applicants submit that these changes overcome the rejection under 35 U.S.C. § 112, second paragraph. Such favorable indication is requested.

Turning now to the art rejections, claims 1-3, 5 and 13 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,999,310 to Shafer et al. Claims 1-3, 10 and 13 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,515,207 to Foo. Claim 11 was rejected under 35 U.S.C. § 103 as being unpatentable over the Shafer et al. patent in view of U.S. Patent No. 5,623,365 to Kuba. Claims 54 and 56 were rejected under 35 U.S.C. § 103 as being unpatentable over the Shafer et al. patent in view of U.S. Patent No. 5,631,721 to Stanton et al. Claim 57 was rejected under 35 U.S.C. § 103 as being unpatentable over the Foo patent in view of the Stanton et al. Applicants submit that the cited art, whether taken individually or in combination, does not teach many features of the present invention, as previously recited in independent claims 1, 2 and 10. Therefore, these rejections are respectfully traversed. Nevertheless, Applicants submit that independent claims 1, 2 and 10, as presented, amplify the distinctions between the present invention and the cited art.

Independent claims 1, 2 and 10 recite various aspects of the projection optical system of the present invention, which includes, among other features, a first imaging optical system and a second imaging optical system.

In independent claim 1, the first imaging optical system has at least one first lens and at least one concave mirror, for forming an intermediate image of an object, the second imaging optical system has at least one second lens and at least one diffractive element, for projecting an image of the object onto an image plane different from the position at which the intermediate image is formed. The projection optical system in independent claim 1 also includes a field optical system disposed between the first and second imaging optical systems. Also, the second imaging optical system has no mirror, and, in the projection optical system, a central position of a pupil is not blocked with respect to light.

In independent claim 2, the first imaging optical system has at least one first lens with a positive power and at least one concave mirror, for forming an intermediate image of an object, and the second imaging optical system has at least one second lens with a positive power and at least one diffractive optical element with a positive power, for projecting the intermediate image onto an image plane. The projection optical system recited in independent claim 2 also includes a field optical system disposed between the first and second imaging optical systems. Also, the projection optical system does not include any one of a lens, a mirror and a diffractive optical element having a negative power.

The first imaging optical system recited in independent claim 10 has at least one first lens and a single concave mirror, for forming an intermediate image of an object, and the second imaging optical system has at least one second lens and at least one diffractive optical element, for projecting an image of the object onto an image plane different from

the position at which the intermediate image is formed. The projection optical system recited in independent claim 10 also includes a substantially flat mirror disposed between the first and second imaging optical systems and at a position adjacent to the position at which the intermediate image is formed. Also, there is only one concave mirror of the first imaging optical system, and the first imaging optical system has no mirror with a power, other than the sole concave mirror.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 1, 2 and 10.

The Shafer et al. patent shows the use of a first imaging optical system 122 having a refractive lens and a concave reflection surface, for forming an intermediate image 126 of an object 120. Light from the intermediate image is imaged upon an image plane 140 by means of a second imaging optical system having a refractive lens and a diffractive surface.

The Foo patent shows the use of a first imaging optical system having a refractive lens and a reflection surface, for forming an intermediate image 70 of an object surface 12, and this intermediate image is re-imaged upon a plane 15 by means of a second imaging optical system.

Applicants submit, however, that the cited art does not teach or suggest the salient features of Applicants' present invention, as recited in independent claims 1, 2 and 10.

For example, independent claim 1 recites features that the second imaging optical system has no mirror, and that, in the projection optical system, the central portion of the pupil is not blocked with respect to light. By such an arrangement, the present invention prevents enlargement in size of the entire optical system, which otherwise results when the second imaging optical system has a mirror.

In the Shafer et al. patent, the light at the central portion of the pupil passes through the central portion of the concave mirror. As a result, the light passing through the central portion of the pupil does not impinge on the imaging plane (wafer surface). Namely, in the Shafer et al. patent, the central portion of the pupil is substantially blocked with respect to light. This is in marked contrast to the present invention recited in independent claim 1.

In the Foo patent, the second imaging optical system also is provided with a mirror. This also is in marked contrast to the present invention recited in independent claim 1.

Independent claim 2 recites that the projection optical system does not have a lens, a diffractive optical element or a mirror having a negative power. Applicants submit that the Shafer et al. and Foo patents utilize optical elements having a negative power. This is in marked contrast to the present invention recited in independent claim 2.

Independent claim 10 recites that the first imaging optical system has a single concave mirror (that is, the concave mirror of the first imaging optical system is only one) and the first imaging optical system has no mirror with a power, other than the sole concave mirror.

The device in the Shafer et al. patent does not use a mirror adjacent to the intermediate image, and the Foo patent uses a plurality of mirrors having powers, in the first imaging optical system as well as in the second imaging optical system. Applicants submit that these arrangements likewise are in marked contrast to the present invention recited in independent claim 10.

For the reasons noted above, Applicants submit that the Shafer et al. and Foo patents do not teach or suggest the salient features of Applicants present invention, as recited in independent claims 1, 2 and 10.

Applicants further submit that the remaining art cited does not cure the deficiencies noted above with respect to the Shafer et al. and Foo patents.

The Examiner relies on the Kuba patent for disclosing details regarding the pitch and the like of a diffractive optical element and the Stanton et al. patent for disclosing a device manufacturing method. Applicants submit, however, that these patents do not cure the deficiencies noted above with respect to the Shafer et al. and Foo patents. Therefore, the Kuba and Stanton et al. patents add nothing to the teachings of the Shafer et al. and Foo patents that would render obvious Applicants' present invention as recited in independent claims 1, 2 and 10.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 1, 2, and 10, also is patentably defined over the cited art.

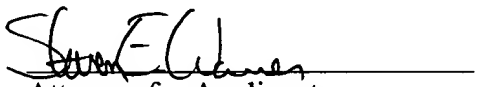
Dependent claims 3, 5, 11, 13, 54, 56, 57 and 60-62 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants submit that this Amendment After Final Rejection clearly places this application in condition for allowance. This Amendment was not earlier presented because Applicants believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Applicants also requests favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance of this application.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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